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# Passive control of wrinkles in woven fabric preforms using a geometrical modification of blank holders

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## Abstract

Textile preforms have become materials of choice in numerous modern industries, partly due to their superior conformability onto complex 3D mould shapes. Maximum formability of this category of composite reinforcements, however, is still limited by defects such as wrinkling, which remains a challenging issue for composite designers during optimization of thermo-stamping operations. The aim of this article is to gain a deeper understanding of the effect of blank holding boundary condition on the extent of wrinkling as well as other local defects such as tow slippage and yarn jamming, and thereby to introduce a passive defect mitigation approach via geometrical modification of the blanks. To verify the applicability of the approach, a series of hemisphere forming experiments under unmodified and modified forming boundary conditions have been performed and compared on both single and multiple ply layups, using a comingled polypropylene/E-glass thermoplastic plain weave.

**Keywords:** A. Fabrics/textiles, B. Defects, E. Forming, Wrinkling

## 1. Introduction

The use of textile fabric reinforcements delivers massive potential in design of lightweight composite structures with superior mechanical properties such as impact resistance. Nonetheless, the deformation mechanisms present during the forming processes of fabrics are complex and far

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